

This checklist of Learning Outcome 1 will enable you to tick off the key concepts and skills you have revised to ensure that you have thoroughly reviewed the content in Area of Study 1. Please note that the key knowledge and skills will not be assessed separately (VCE Study Design, 2009) and have therefore been integrated to aid your revision process.

On completion of this unit, you should be able to explain the relationship between the brain, states of consciousness (including sleep) and behaviour, and describe the contribution of selected studies and brain research methods to the investigation of brain function. To achieve this outcome, you will need to be able to demonstrate knowledge and skills pertaining to the concepts outlined in this checklist

Practice exam questions: Mind, brain and body

QUESTION 500

- Which of the following characteristic is **not** consistent with being in a state of ordinary or normal waking consciousness?
- A Attention is focused on external stimuli or on internal thoughts and feelings.
 - B Thinking is clear and structured.
 - C Continuity of one's memory over time may be disrupted.
 - D There is an awareness of time constraints.

QUESTION 600

- André, an accomplished musician, often likes to play his violin while he is talking with his friends and is able to do so without being distracted from the discussion. For André, playing the violin would be considered
- A a controlled process, because it involves higher levels of awareness, mental effort and focused attention.
 - B an automatic process, because it involves higher levels of awareness, mental effort and focused attention.
 - C a controlled process, because it does not interfere with the other task and can be performed with little conscious effort and minimal attention.
 - D an automatic process, because it does not interfere with the other task and can be performed with little conscious effort and minimal attention.

QUESTION 7000

Rebecca is working quietly during her study period. During this time, she reminisces about the party she went to on the weekend, thinks about how to balance her part-time job with her basketball roster, and tries to plan what she is going to wear to her Year 12 formal. Rebecca's thought processes are most indicative of which state of consciousness?

- A a state of drifting fantasies
- B an altered state of consciousness
- C a highly focused state of awareness
- D a state of normal waking consciousness

Instructions

- Each multiple-choice question is worth 1 mark.
- Short-answer questions are worth 1 mark unless otherwise indicated.

Consciousness

Solutions start on page 110.

Multiple-choice question

QUESTION 10

William James described consciousness as

- A the link between mind and body.
- B a stable, consistent pattern of thoughts and feelings.
- C an ever-changing stream of awareness.
- D being difficult to study as its processes are largely unknown to the individual.

Short-answer questions

QUESTION 20

What is meant by the term 'consciousness'?

QUESTION 300

What does the term 'state of consciousness' refer to?

States of consciousness

Solutions start on page 110.

Multiple-choice questions

QUESTION 40

As a result of consuming _____, an individual may experience an altered state of consciousness involving a sense of relaxation and lowered inhibitions due to a reduction in the activity of the central nervous system.

- A alcohol
- B stimulants
- C hallucinogens
- D amphetamines

Short-answer questions

QUESTION 80

What factors would indicate that you are currently in a state of normal waking consciousness?

3 marks

QUESTION 90

Using an example to clarify your answer, explain what is involved in controlled processes.

2 marks

QUESTION 100

Describe two characteristics an individual would expect in an altered state of consciousness.

2 marks

QUESTION 110

What types of behaviour would be indicative of automatic processes? Clarify your answer with an example.

2 marks

QUESTION 1200

Rather than being dependent on strong analgesics, Annalise has been using natural methods to control her chronic back pain. When the pain starts to get too much for her, she takes time out to deliberately put herself into a state of deep relaxation by sitting in a comfortable position, closing her eyes, and concentrating on her breathing in order to block out any distractions.

- What method is Annalise applying in order to control her back pain?
- What level of consciousness would Annalise be experiencing in this state?
- Describe two characteristics of the state of deep relaxation that would support your answer for part ii.

2 marks

QUESTION 13000

Which state of consciousness do people consider as providing them with a perception of 'reality'? Why?

2 marks

Sleep

Solutions start on page 111.

Multiple-choice questions

QUESTION 140

Recordings of brainwaves in sleeping patients indicate that during sleep the brain

- changes in its pattern of activity.
- shuts down, showing almost no activity at all.
- experiences a general inhibition and reduction in its functioning.
- shows a gradual increase in gamma waves as patients go into deeper sleep.

QUESTION 150

The evolutionary theory of sleep focuses on its role in promoting the survival of the organism. According to this theory,

- animals that are safer from predators tend to sleep less.
- stage 4 sleep is required for the nocturnal secretion of growth hormone.
- animals tend to sleep at night because they can rest while their predators are asleep.
- sleep keeps the animal immobile to conserve energy and to avoid accidents at night.

QUESTION 1600

Which of the following statements is accurate concerning REM and NREM sleep?

- An individual always cycles through the four levels on NREM before going into REM sleep.
- As people age, the percentage of time spent in NREM sleep increases whereas the proportion of time spent in REM sleep decreases.
- The first half of the sleep cycle is mainly spent in NREM sleep, whereas the latter cycles are overtaken by progressively shorter periods of REM sleep.
- As their bodies have not yet adjusted to the NREM cycle, children spend most of their sleeping time in REM.

QUESTION 1700

The restorative theory of sleep would explain why

- bodily processes and tissue damage are repaired during the paralysis of REM sleep, while brain processes are restored during the slower brain activity in NREM sleep.

- organisms are immobilised for long periods while they sleep, making them less conspicuous to potential attackers.
- longer periods of sleep (especially stage 4) occur after heavy physical exercise.
- adults require longer periods of sleep in comparison to children in order to recover from balancing their work and social life.

QUESTION 18000

REM sleep is sometimes referred to as 'paradoxical' sleep because

- there is no change in any of the autonomic responses (heart rate, blood pressure and breathing) despite changes in the type of brainwave patterns present in REM sleep.
- the EEG patterns recorded during REM sleep are similar to those in the waking state.
- researchers cannot understand why the eyes display the rapid movements that give this stage of sleep its name.
- upon being woken from REM sleep, the descriptions given by subjects as to the content of their dreams provide no clear indication as to the purpose of this stage of sleep.

QUESTION 19000

Which of the following research findings are inconsistent with Oswald's (1966) restoration theory of sleep?

- Growing children need more sleep, especially REM sleep.
- Longer periods of sleep (especially stage 4) occur after heavy physical exercise.
- Patients who survive drug overdoses experience six to eight weeks of increased REM sleep.
- NREM sleep helps to restore bodily processes and tissue damage, while REM sleep restores brain processes.

Short-answer questions

QUESTION 2000

Describe the typical nightly sleep pattern for an adult human.

3 marks

QUESTION 2100

What proportion of sleep is spent in NREM?

QUESTION 2200

Provide two reasons as to why an animal's chances of survival might be improved if they slept at night.

2 marks

QUESTION 23000

What pieces of evidence do not fit with the restorative theory of sleep?

2 marks

QUESTION 24000

What is the main criticism of the survival theory of sleep?

Physiological responses which indicate different states of consciousness

Solutions start on page 112.

Multiple-choice questions

QUESTION 250

The pattern of brainwaves that are characteristic of an ordinary individual in a state of normal waking consciousness would be

- alpha waves.
- beta waves.
- delta waves.
- theta waves.

QUESTION 260

Which stage of sleep can be identified by brainwave patterns that include the presence of spindles and spikes known as K complexes?

- NREM stage 1
- NREM stage 2
- NREM stage 4
- REM

QUESTION 2700

EEG patterns associated with altered states of consciousness such as meditation generally have a _____ amplitude and a _____ frequency.

- A low; low
- B high; low
- C medium-high; irregular
- D low-medium; relatively high

QUESTION 2800

The electrical activity of our brain changes as we progress from being awake and alert through to a state of deep sleep. The sequence of the dominant brainwaves within this progression is

- A alpha, beta, gamma, delta.
- B alpha, beta, delta, theta.
- C alpha, beta, theta, delta.
- D beta, alpha, theta, delta.

QUESTION 2900

The brain activity observed during REM sleep

- A shows typical alpha rhythms.
- B is extremely slow and regular.
- C can indicate the degree of emotional content of dreams.
- D is similar to that recorded in subjects who are wide-awake.

QUESTION 30000

When used by sleep laboratories to monitor stages of sleep, sensors for an _____ would most likely be located on the sleeper's jawline.

- A electroencephalogram
- B electro-oculargram
- C electromyograph
- D electrocardiograph

Short-answer questions

QUESTION 3100

How would an individual's heart rate indicate their state of consciousness?

QUESTION 3200

How can the galvanic skin response act as an indicator of an individual's state of consciousness?

3 marks

QUESTION 3300

How does an individual's body temperature relate to the study of states of consciousness?

QUESTION 34000

Why would researchers prefer techniques that measure physiological responses to self-report methods in order to assess an individual's state of consciousness?

2 marks

QUESTION 35000

How is an individual's state of consciousness shown by the electrical activity of the brain?

3 marks

QUESTION 36000

Describe some of the physiological attributes of REM sleep that distinguish it from the other sleep stages.

2 marks

Sleep deprivation

Solutions start on page 113.

Multiple-choice questions

QUESTION 370

Which of the following is most likely to occur after extended periods (more than 60 hours) of sleep deprivation?

- A alterations in personality characterised by sudden, marked mood swings
- B irreversible psychological disorders
- C disorientation, delusions and hallucinations
- D a permanent disruption to the individual's sleep-wake cycle

QUESTION 3800

Studies have shown that subjects with mild REM sleep deprivation will experience

- A hallucinations and delusions.
- B a disruption in their memory for the affected period.
- C a subsequent decrease in the amount of REM sleep on later nights.
- D irritability, and will find it hard to concentrate and perform simple tasks.

QUESTION 3900

Prolonged sleep deprivation would cause psychological effects such as _____ and physiological effects such as _____

- A fatigue; anxiety
- B cognitive disturbance; dizziness
- C problems focusing; mood swings
- D heightened sensitivity to pain; attention deficit

QUESTION 4000

A microsleep is best described as a

- A very long alteration of awareness that occurs when concentration is low.
- B very short period of sleep characterised by a predominance of delta waves.
- C very short loss of consciousness resulting in total relaxation.
- D very short period of sleep that occurs while a person is actually awake.

Short-answer questions

QUESTION 410

List some of the typical effects of a short period of sleep deprivation.

3 marks

QUESTION 420

Describe the symptomatology of severe sleep deprivation.

3 marks

QUESTION 43000

How can task performance be impaired by sleep deprivation?

2 marks

Divisions of the nervous system

Solutions start on page 113.

Multiple-choice questions

QUESTION 440

Which nervous system is activated in an emergency?

- A the sympathetic nervous system
- B the peripheral nervous system
- C the parasympathetic nervous system
- D the somatic nervous system

QUESTION 4500

As you read this question, your eyes are moving from word to word under the direction of the _____ nervous system.

- A autonomic
- B parasympathetic
- C somatic
- D sympathetic

QUESTION 4600

The autonomic nervous system is responsible for

- A transmitting motor information.
- B the functioning of internal organs.
- C the contraction rate of skeletal muscles.
- D detection and transduction of sensory information.

QUESTION 4700

While she was out walking, Jacinta was startled by what she thought was a gunshot, causing her heart to race and her blood pressure to increase. She was relieved when she realised that it was only a car backing down the street. As she continued on her walk, Jacinta's blood pressure and heart rate returned to normal levels due to activity in her _____ nervous system.

- A somatic
- B sympathetic
- C central
- D parasympathetic

Short-answer questions

QUESTION 480

The branch of the peripheral nervous system that carries messages from sensory receptors to the central nervous system and controls voluntary movement of the skeletal muscles is the _____ nervous system.

QUESTION 490

The branch of the peripheral nervous system that connects the central nervous system with the internal organs and glands and which controls the arousal and subsequent relaxation of these organs is the _____ nervous system.

QUESTION 50

Ian was walking to his friend's house one afternoon and took a short-cut through a laneway. As he was going behind one particular shop, a large Rottweiler suddenly ran at him, barking furiously. Despite the dog being behind a cyclone wire fence, Ian reacted by jumping back, and noticed that he was breathing heavily and that his heart was racing as a result of an adrenaline 'rush'.

- i Ian's reaction is referred to as the _____ response.
- ii This occurs when the _____ branch of the nervous system is activated.

The cerebral lobes and their functions

Solutions start on page 114.

Multiple-choice questions

QUESTION 51

The _____ within the cerebral cortex processes information relating to bodily sensation.

- A frontal lobe
- B occipital lobe
- C parietal lobe
- D temporal lobe

QUESTION 52

Which lobes are important to the sense of hearing and understanding language?

- A frontal
- B occipital
- C parietal
- D temporal

QUESTION 53

Lauryn fell heavily from her horse while riding in a cross-country event, and suffered head injuries as a result. Following the accident, her vision has become impaired. Lauryn probably suffered damage to her _____.

- A frontal lobe.
- B occipital lobe.
- C parietal cortex.
- D temporal lobe.

QUESTION 54

The association areas of the cerebral cortex

- A are largest in the brains of lower species.
- B process sensory information at a basic level.
- C are not essential in the performance of higher mental functions.
- D are directly related to such functions as language, memory and thinking.

QUESTION 55

If someone incurred frontal lobe damage in an accident, which of the following symptoms would you expect to occur?

- A inability to understand conversational language
- B reduced planning ability and changes in personality
- C impairment in the capacity to hear extreme frequencies of sound
- D development of persistent spots within the visual field

QUESTION 56

If a neurosurgeon applied a brief electrical current to the cortex, movement and muscular twitches might be triggered in various parts of the body. The area stimulated is the _____.

- A association cortex of the occipital lobes.
- B cerebellum.
- C somatosensory area of the parietal lobe.
- D motor cortex of the frontal lobes.

QUESTION 57

After suffering a stroke, Mr Peterson's coordination skills and responsiveness to stimuli quickly returned to normal. Unfortunately, however, he began to experience unusual difficulty in solving simple problems and scheduling his daily activities. It is most likely that Mr Peterson suffered damage to his _____.

- A autonomic nervous system.
- B thalamus.
- C association areas.
- D hypothalamus.

Short-answer questions

QUESTION 58

Describe the function of the motor area within the frontal lobes of the cerebral cortex.

QUESTION 59

Describe the function of the somatosensory region of the parietal lobes of the cerebral cortex.

QUESTION 60

Acoustic stimuli are processed by the _____, located in the _____ lobe of the brain.

2 marks

QUESTION 61

What is the function of Wernicke's area? Where in the cerebral cortex is this area located?

2 marks

QUESTION 62

A stroke patient has been left with paralysis to their left arm, but can still feel stimuli applied to it. The probable location of the stroke would be _____ within _____.

2 marks

QUESTION 63

While working within a geriatric rehabilitation unit, you are assigned an elderly patient who has suffered a stroke. Bill is a very friendly man, and greets you by extending his left hand as he is still partly paralysed down his right side. He is very lucid and can understand everything that you say to him, but he is only able to respond in grunts or unintelligible noises.

- i What term describes Bill's inability to speak as a result of his stroke?
- ii From the symptoms described, what is the probable location of the stroke within the brain?
- iii Referring to the symptoms described, explain your diagnosis.

QUESTION 64

Explain why different body areas vary in terms of relative sensitivity.

Hemispheric specialisation

Solutions start on page 114.

Multiple-choice questions

QUESTION 65

What is the relationship between verbal and non-verbal functions of the brain?

- A Verbal functions are associated with Broca's area and non-verbal functions are associated with the auditory cortex.
- B The right hemisphere controls non-verbal functions, while verbal functions are controlled by the left hemisphere.
- C Both verbal and non-verbal functions take place in the temporal lobe.
- D Verbal functions are controlled by the right hemisphere, whereas the left hemisphere controls non-verbal functions.

QUESTION 66

The right hemisphere of the human brain is typically involved in _____.

- A logical tasks.
- B activities involving visualisation.
- C arithmetical problems.
- D linguistic activities.

QUESTION 67

The structure of the brain responsible for exchanging information between hemispheres is the _____.

- A lateral geniculate nucleus.
- B medulla oblongata.
- C corpus callosum.
- D thalamus.

QUESTION 68

Most research on the brain would lead us to the conclusion that _____.

- A hemispheric functioning is reversed in the female population.
- B normal individuals can be taught how to use only one hemisphere at a time.
- C the activities of both hemispheres of the brain combine to produce most behaviour.
- D there is no significant difference between the behavioural functions of the two hemispheres of the brain.

QUESTION 69000

Elsie is an elderly patient who has suffered a stroke. She is still partly paralysed down her left side, and often has trouble recognising other people, including her friends and relatives. On the basis of this information, you are able to diagnose that the location of the stroke is in the

- A cerebellum.
- B optic chiasma.
- C left cerebral hemisphere.
- D right cerebral hemisphere.

QUESTION 70000

A patient who systematically ignores features of the environment on his left and neglects the left side of his body is suffering from

- A agnosia.
- B expressive aphasia.
- C a lesion of the right parietal lobe.
- D receptive aphasia.

QUESTION 71000

Michael Gazzaniga and his colleagues have done a lot of research into the phenomenon of the 'split brain', which involves the severing of the connection between the cerebral hemispheres. Research findings have shown that

- A objects presented to the right visual field can be recognised and named verbally.
- B objects presented to the left visual field can be recognised and named in writing.
- C information still moves between the two sides of the brain.
- D all of the above.

QUESTION 72000

If a 'split-brain' patient were given a key (hidden from sight) to feel with his left hand, he

- A could easily name what he had touched.
- B would be unable to describe the object.
- C would be able to point to the key with his right hand.
- D would have to wait for the information transfer to take place before describing it.

Short-answer questions

QUESTION 730

Where is the corpus callosum located within the brain? Briefly explain its function.

2 marks

QUESTION 74000

Describe the cognitive and behavioural functions controlled by the left hemisphere of the brain of a 'normal' individual.

3 marks

QUESTION 75000

Describe the cognitive and behavioural functions controlled by the right hemisphere of the brain of a 'normal' individual.

3 marks

QUESTION 76000

Neglect syndrome is caused by damage to the right hemisphere of the brain. Briefly outline the symptoms of this condition, giving typical behavioural examples of a patient suffering this disorder.

3 marks

QUESTION 77000

Barry underwent a 'split-brain' operation to help control his epilepsy. In a follow-up interview, he was shown a picture of a dog in such a way that it was only in his left visual field. He was unable to name what he had seen. Why?

3 marks

The reticular activating system and thalamus

Solutions start on page 115.

Multiple-choice questions

QUESTION 78000

Stimulation of the _____ leads to alert consciousness and activates the waking pattern of beta brainwaves.

- A thalamus
- B midbrain
- C temporal lobe
- D reticular activating system

QUESTION 79000

Selective distribution of information to the appropriate parts of the cerebral cortex for further processing is performed by the

- A reticular activation system.
- B frontal lobe.
- C thalamus.
- D brainstem.

QUESTION 80000

Despite being fast asleep, you are woken by the awareness of a strange noise in your house. This would primarily be due to the action of the

- A pituitary gland.
- B hypothalamus.
- C sympathetic nervous system.
- D reticular activation system.

Short-answer question

QUESTION 810

Describe the key functions of the thalamus.

2 marks

Studies investigating cognitive processes

Solutions start on page 115.

Short-answer questions

QUESTION 820

What is meant when psychologists refer to 'perceptual anomalies'?

QUESTION 830

Describe what happens in the motion after-effect.

QUESTION 84000

What is involved in the process of 'change blindness'?

QUESTION 85000

Explain the phenomenon of synaesthesia.

Brain research techniques

Solutions start on page 116.

Multiple-choice questions

QUESTION 860

History has recorded the plight of Phineas Gage and described what the effects are if brain matter is removed from the frontal lobes. His story is an example of

- A ablation.
- B a case study.
- C surgical lesioning of brain tissue.
- D chemical stimulation of cortical areas.

QUESTION 870

A CT scan differs from an MRI because the CT scan

- A uses a computer to organise and analyse the data received from the detectors.
- B provides 3D images of the area under examination.
- C places people in a strong magnetic field.
- D uses X-rays.

QUESTION 880

_____ records the absorption of a radioactive form of glucose by active areas of the brain to produce a visual display of brain activity.

- A Computerised tomography
- B Magnetic resonance imaging
- C Positron emission tomography
- D The electroencephalograph (EEG)

QUESTION 89000

Magnetic resonance imaging (MRI)

A monitors the overall electrical activity within the brain.

B provides functional pictures of the brain's anatomical structures.

C can produce extremely detailed, three-dimensional images of the brain.

D uses radioactive chemicals to produce a pictorial representation of brain activity.

QUESTION 90000

Which of these methods of brain research involves invasive procedures as a part of the process?

- A computerised tomography scan (CT scan)
- B electrical brain stimulation
- C electroencephalograph (EEG)
- D magnetic resonance imaging (MRI scan)

Short-answer questions

QUESTION 910

Outline the process of magnetic resonance imaging (MRI).

2 marks

QUESTION 92000

How can case studies be used for brain research?

2 marks

QUESTION 93000

What are some of the major problems with the use of case studies for brain research?

2 marks

QUESTION 94000

How does an electroencephalograph (EEG) work?

2 marks

QUESTION 95000

Describe the method used by Penfield and his associates to investigate the functions controlled by various cerebral structures.

2 marks

QUESTION 96000

What occurs in the process of transcranial magnetic stimulation (TMS)?

QUESTION 97000

Describe the process of computerised tomography (CT scan) in terms of its use in brain research.

QUESTION 98000

What is the main purpose of using a single photon emission computed tomography (SPECT) scan in brain research?

QUESTION 99000

What is involved in a positron emission tomography (PET) scan?

3 marks

QUESTION 100000

Clarify the role of an fMRI scan in brain research.

3 marks

Chapter 2: Memory

The role of the nervous system in memory

The role of the neuron in memory formation (Kandel, 1965, 2000)

Invertebrates have fewer neurons and much simpler nervous systems than vertebrates and yet can display complex forms of learning, such as associative conditioning. As such, they have provided valuable models for studies into the cellular and molecular mechanisms of learning and memory.

Since the 1960s, Kandel's research has centred on the sea mollusc *aplysia* (or sea hare). This species has relatively few nerve cells (approx 20 000), many of them very large and therefore easy to study, enabling Kandel and his team to identify, through stimulation,

various types and groups of neurons involved in *aplysia*'s behaviour. Identification of the neuronal connections allowed the researchers to examine which components of the neural circuits changed during learning, as well as the molecular mechanisms responsible for the changes in neuronal function.

The *aplysia* has a protective siphon withdrawal reflex to guard its gills, which Kandel used as the focus of his study into the basic learning mechanisms. In activating this reflex over and over again, the synaptic connections in the same circuit of neurons were strengthened and became more efficient, resulting in an increased release of neurotransmitters, and the slug became able to avoid the negative stimuli that had initially caused the reflex.

These experiments, combined with his later research on mice, determined that biochemical changes in synaptic function form different types of memory. Kandel showed that weak stimuli give rise to certain